Grant County
PUBLIC UTILITY DISTRICT
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VIA ELECTRONIC FILING

February 12, 2010

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
Mail Code: DHAC, PJ-12
888 First Street, N.E.
Washington, D.C. 20426

RE: **Priest Rapids Hydroelectric Project No. 2114 Compliance Filing**
Article 404–Fishery Operations Plan – P-2114-116

Dear Secretary Bose,

Public Utility District No. 2 of Grant County, Washington (Grant PUD) respectfully submits its Fishery Operations Plan to meet the requirements of Article 404, and subsequent FERC orders, in the Priest Rapids Project License No. 2114 (License).

The License provides that the Fishery Operations Plan be prepared in consultation with the National Marine Fisheries Service (NMFS), Washington Department of Ecology (WDOE), Washington Department of Fish and Wildlife (WDFW), and the United States Fish and Wildlife Service (USFWS) and submitted to FERC as final within six months of License issuance. Other mandate and commitments associated with the new License also reference operations criteria as they may affect fish or other resources.

On May 27, 2009, FERC approved the Fishery Operations Plan submitted by Grant PUD on January 20, 2009. Within the FERC order modifying and approving the 2009 Fishery Operations Plan, FERC also ordered the following:

> *(B) The Public Utility District No. 2 of Grant County shall file an annual report detailing fisheries related operations from the previous year. The report shall include, but not be limited to the following: (a) descriptions of fisheries-related operating criteria that are modified from the original Fishery Operations Plan for the project turbines, the unit No. 11 fish passage facility, fishways, spillways, and sluiceways; (b) rationale for why changes were adopted and the effectiveness of these modifications in safely passing fish; and (c) an annual schedule for operation. The licensee shall submit the report to*

members of the Priest Rapids Coordination Committee and Priest Rapids Fish Forum and allow for a minimum of 30 days to comment before filing the report with the Commission by February 15 of each year.

Consistent with the FERC ordering paragraph provided above, the enclosed document details the fisheries operations from the previous year and has been provided to the consulting parties for a 30-day comment period (January 7, 2010 to February 8, 2010). During this review period comments were received from USFWS and NMFWS; refer to Appendix B of the plan. A summary table of the comments received and Grant PUD's response to those comments are included in Appendix C.

Commission staff with any questions should contact Fish, Wildlife and Water Quality Manager Tom Dresser at 509-754-5088, ext. 2312, or at tdresse@gcpud.org.

Respectfully,

Julie E. Pyper
License Implementation Coordinator
Public Utility District No. 2 of Grant County

Cc (via email): Priest Rapids Coordination Committee
Priest Rapids Fish Forum

Priest Rapids Hydroelectric Project (P-2114)

Fishery Operations Plan

License Article 404
2010

By
Public Utility District No. 2
of Grant County, Washington

FEBRUARY 2010

Executive Summary

As required by the Federal Energy Regulatory Commission's (FERC's) License Order for the Priest Rapids Project (Project) P-2114, issued April 17, 2008, this 2010 Fishery Operations Plan (FOP) describes the fisheries-related operating criteria, protocols, and annual schedule of operation and inspection for the Priest Rapids Project turbines, Wanapum Future Unit Fish Bypass (WFB), spillways, sluiceways, fishways, and off-ladder adult fish trapping facility.

The turbines at Wanapum and Priest Rapids dams operate on an as-needed basis, based on power demand in the region throughout the year. During the juvenile salmonid out-migration season the turbines operate in the "Fish Mode" protocol. Outside the juvenile salmonid out-migration season they operate in the most electrical production-efficient mode. Turbines are inspected as-needed based on the degree of in-service time.

The WFB operates continuously throughout the juvenile salmonid out-migration season to facilitate higher survival rates of juvenile salmonids passing Wanapum Dam. At a tailwater elevation of 488.0 feet or higher, the WFB is presently operated to pass 20 kcfs of water. The WFB is inspected and maintained during the non-operation period.

The spillway at Wanapum Dam is operated on an as-needed basis to pass inadvertent spill, although tainter gate spill remains a viable juvenile salmonid passage route alternative if salmonid passage survival standards are not met. The inadvertent spill protocol for Wanapum Dam is complex but an example from 2009 is outlined in detail in Tables 1 and 2 (Appendix A) in this plan. Inspections are conducted during non-operation periods. The spillway at Priest Rapids Dam will be operated on an as-needed basis to pass inadvertent spill if an alternative passage route (i.e. top-spill passage) can be developed and meets salmonid passage survival standards. As with the Wanapum Dam spillway, the Priest Rapids Dam spillway (tainter gate spill) remains a viable juvenile salmonid passage route alternative. As part of Grant PUD's development of alternative spill passage for juvenile salmonids at Priest Rapids Dam during the 2010 out-migration, gates 19 and 20, which are fitted with a top-spill bulkhead designed to facilitate higher survival rates of juvenile salmonids, are operated fully open, but only passing up to 8 kcfs per gate because of the bulkhead. In addition, gate 21 is opened to provide bottom-spill. A change from the 2009 Priest Rapids Top-Spill Operations Configuration will be the "pinning" of the sluiceway closed, and operating gate 22 as a bottom-spill. This change at gate 22 was based on route-specific survival rates through the sluiceway from 2008 and 2009. The amount of bottom-spill that will be passed via gates 21 and 22 is presently under discussion with the PRCC. Table 5 outlines the Priest Rapids Dam inadvertent spill protocol for periods outside the juvenile salmonid out-migration season. Inspection of the Priest Rapids spillway is conducted during non-operation periods.

For adult fall-back, the sluiceway at Wanapum Dam is operated continuously from the time the WFB is closed at the end of the juvenile salmonid out-migration season (typically mid- to late-August) through November 15, annually. The WFB serves as the adult salmonid fall-back route while it is in operation. The sluiceway at Priest Rapids Dam is operated continuously from the initiation of juvenile salmonid out-migration season (typically mid- to late-April) through November 15, annually. Inspections of the Priest Rapids Project spillways are conducted during non-operation periods.

The Priest Rapids Project fishways are operated continuously during the adult fish-passage season, April 15 through November 15. The fishways are taken out of service during this time only in the event of emergency maintenance. The fishway operating criteria are outlined in Tables 1 and 2. Annual inspections of the Project fishways occur on an as-needed basis outside of the adult fish-passage season, depending primarily on elapsed time since the last inspection. Necessary fishway dewaterings for inspections and maintenance typically occur between December 1 and February 28.

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Biological Opinion	2008 National Marine Fisheries Service Biological Opinion for the Priest Rapids Project
CCG	conduit closure gate
CFD	computational fluid dynamics
Corps	United States Army Corps of Engineers
DPAAP	Downstream Passage Alternatives Action Plan
FCE	fish collection efficiency
FERC	Federal Regulatory Energy Commission
FPC	Fish Passage Center
fps	feet per second
GIG	Gravity Intake Gate
Grant PUD	Public Utility District No. 2 of Grant County
kcfs	thousand cubic feet per second
LDC	left diffusion chamber
LEW	left entrance weir
LSE	left slotted entrance
LV	left valve
NMFS	National Marine Fisheries Service
OG	orifice gate
PRCC	Priest Rapids Coordinating Committee
Project	Priest Rapids Project
PRFF	Priest Rapids Fish Forum
RDC	right diffusion chamber
REW	right entrance weir

RSE	right slotted entrance
RV	right valve
SE	slotted entrance
Settlement Agreement	Priest Rapids Project Salmon and Steelhead Settlement Agreement
TG	Tainter Gate
USFWS	United States Fish and Wildlife Service
WFB	Wanapum Fish Bypass

1.0 Introduction

The Priest Rapids Project (FERC No.2114) is owned and operated by Public Utility District No. 2 of Grant County (Grant PUD). The Priest Rapids Project (Project) includes two hydroelectric developments, Wanapum and Priest Rapids dams.

Wanapum Dam, the upstream development, consists of a 14,680-acre reservoir and an 8,637-foot-long by 186.5-foot-high dam spanning the river. The dam consists of left and right embankment sections; left and right concrete gravity dam sections; a left and right fish passage structure, each with an upstream fish ladder; a gated spillway; an intake section for future generating units; a downstream fish passage structure in one of the unused intake sections (unit No. 11); and a powerhouse containing 10 vertical-shaft integrated Kaplan turbine/generator sets with a total authorized capacity of 1,038 MW (FERC 2008). The Priest Rapids development consists of a 7,725-acre reservoir and a 10,103-foot-long by 179.5-foot-high dam spanning the river. The dam consists of left and right embankment sections; left and right concrete gravity dam sections; a left and right fish passage structure each with an upstream fish ladder; a gated spillway section; a powerhouse containing 10 vertical shaft integrated Kaplan turbine/generator sets with a total authorized capacity of 855 MW; and a fish hatchery (FERC 2008).

On April 17, 2008 the Federal Energy Regulatory Commission (FERC) issued its Order Issuing New License for the Priest Rapids Project to Grant PUD. Article 404 of the license order, *Fishery Operations Plan*, requires the following:

> *Within six months of the issuance date of the license, the licensee shall file for Commission approval a fishery operations plan.*
>
> *The plan shall include, but not be limited to the following: (a) descriptions of fisheries-related operating criteria for the project turbines, the unit No. 11 fish passage facility, fishways, spillways, and sluiceways; (b) descriptions of fisheries-related protocols for startup, in-season operation, shutdown, and inspection of the project turbines, the unit No. 11 fish passage facility, fishways, spillways, and sluiceways; and (c) an annual schedule for operation and inspection of these facilities.*
>
> *The licensee shall prepare the plan after consultation with the National Marine Fisheries Service, Washington Department of Ecology, Washington Department of Fish and Wildlife, and U.S. Fish and Wildlife Service. The licensee shall include with the plan, copies of comments and recommendations on the completed plan after it has been prepared and provided to the above entities, and specific descriptions of how the comments of the above entities are accommodated by the plan. The licensee shall allow a minimum of 30 days for the above entities to comment and to make recommendations before filing the plan with the Commission.*
>
> *The Commission reserves the right to require changes to the plan. Implementation of the plan shall not begin until the plan is approved by the Commission. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.*

Under its new License, Grant PUD is also directed to comply with the National Marine Fisheries Service's (NMFS) 2008 Biological Opinion (NMFS 2008) and the Washington Department of Ecology's (WDOE's) 401 Water Quality Certification (WDOE 2007). The License also adopts other agreements, including the 2006 Priest Rapids Salmon and Steelhead Settlement Agreement (Settlement Agreement). It is from these documents that the Priest Rapids Coordinating Committee (PRCC) and the Priest Rapids Fish Forum (PRFF) are established to work with Grant PUD in an arena of adaptive management. Adaptive management is an active systematic process for continually improving management policies and practices by sequential learning from the outcomes of operational programs. In implementing this adaptive management concept, Grant PUD will employ management programs designed to experimentally compare selective policies or practices by evaluating alternative hypotheses for the system being managed. This process will be a collaborative effort within the PRCC and/or PRFF, as stated in the aforementioned documents and agreements. Adaptive management is not complete until the planned management actions have been implemented, measured and evaluated, and the resulting new knowledge has been fed back into the decision-making process to aid in future planning and management. The fundamental objective of adaptive management, with respect to the Priest Rapids Project, is to achieve the passage performance standards by 2013.

1.1 Roles and Responsibilities of PRCC and PRFF

The roles and responsibilities of the PRCC and the PRFF are described in the Water Quality Certification for the Priest Rapids Project, which states:

> *Priest Rapids Coordination Committee (PRCC). As used in this Certification, the PRCC is the forum formed under the Salmon Agreement for purposes of coordinating and implementing that agreement. For purposes of this Certification, Grant PUD will consult with the PRCC and other interested tribes and agencies with fish management authority on Covered Species. For any plans or reports required per the Salmon Agreement, Grant PUD shall provide copies to Ecology, which shall include documentation of consultation with the above entities, copies of comments received by the entities, descriptions of how the comments were accommodated, descriptions of the basis for any disagreements, and the position and rationale of the entities on that issue. In its decision-making on Covered species, the PRCC shall consider the effects of proposed actions on Non-Covered Species.*
>
> *Priest Rapids Fish Forum (PRFF). The PRFF is to consist of Grant PUD and the tribes and agencies with fish management authorities for protection of the non-Covered species. Grant PUD shall consult with the PRFF as provided in this Certification with respect to the non-Covered species. Where Grant PUD is required to consult with the PRFF, it shall be by the process described under Section 6.*
>
> *Coordination between PRFF and PRCC. In the event that conflict or the potential for conflict arises between actions contemplated or required for Covered Species and actions contemplated or required for non-Covered Species. Grant PUD shall*

notify in writing members of the PRFF and PRCC and initiate the consultation process. (Washington Department of Ecology, 2008, p. 23-24).

1.2 Adaptive Management Approach to Fishery Operations

The adaptive management approach that is used to direct Priest Rapids Project fishery operations is described in Appendix B of the Order Issuing New License, Fishways Prescriptions, Article 27. It states:

> *Adaptive management is an active systematic process for continually improving management policies and practices by sequential learning from the outcomes of operational programs. To implement adaptive management the Licensee shall employ management programs that are designed to experimentally compare selective policies or practices by evaluating alternative hypotheses about the system being managed. The sequence of adaptive management steps shall include: (1) problem assessment, (2) project design, (3) implementation, (4) monitoring, (5) evaluation, and (6) adjustment of future decisions. Adaptive management shall not be complete until the planned management actions have been implemented, measured and evaluated and the resulting new knowledge has been fed back into the decision-making process to aid in future planning and management. The fundamental objective of adaptive management with respect to the Priest Rapids Project is to achieve the passage performance standards by 2013* (USFWS, 2008, p. 14).

The fundamental objective of adaptive management, with respect to the Priest Rapids Project, is to achieve the passage performance standards by 2013. (Settlement Agreement, 2006).

Achieving these passage performance standards (i.e. survival rates) is the basis for this Fishery Operations Plan and the guidance of the PRCC. Grant PUD is using smolt-survival studies to evaluate progress toward meeting 95% juvenile dam-passage survival and 93% juvenile project-passage (one dam and one reservoir) survival. Structural changes at the dams are one approach that has been pursued to increase dam-passage survival rates, as outlined in the Downstream Passage Alternatives Action Plan (DPAAP) (Voskuilen, 2003). Results of this approach have been the construction of the Wanapum Fish Bypass (WFB) and the on-going top-spill studies taking place at Priest Rapids Dam. In keeping with the adaptive management approach, the Grant PUD Fish Bypass Design Team has been "amending" the DPAAP with its "Path Forward" documents describing the process used to formulate a particular fish bypass design and also report the methods used to evaluate that design. Through this approach of: (1) problem assessment, (2) project design, (3) implementation, (4) monitoring, (5) evaluation, and (6) adjustment of future decisions, Grant PUD presents to the PRCC its programs and studies designed to experimentally compare selective policies or practices for the purpose of meeting its performance standards for out-migrating juvenile salmonids.

2.0 Description of Turbine Operating Criteria and Protocols

Project turbines are operated in a protocol referred to as "Fish Mode" and also "Ganging Units" during the juvenile salmonid out-migration season (typically mid- to late-April through mid- to late-August), based on smolt index counts conducted by Washington Department of Fish and

Wildlife (WDFW) at the Rock Island Smolt Monitoring Station) in order to maximize turbine passage survival rates of juvenile salmonids. Fish Mode was the result of using Hill Curves, Theoretical Avoidable Losses calculations, turbine discharge rates, head, and fish survival curves (based on 1996 and 2005 balloon-tag evaluations of salmonid smolts through the turbines) to determine the operating range of the turbines and maintain a minimum fish survival rate of 95 percent. For Wanapum Dam, this means an operating range of 11.8 to 15.7 kcfs per turbine, and for Priest Rapids Dam, turbine units are operated between 11.2 to 17.5 kcfs. Upon further investigation of the issue concerning smolt-passage survival through turbines, it was determined that passage survival rates for out-migrating juvenile salmonids are influenced not only by how a turbine is operated (i.e. Fish Mode), but also how the dam's powerhouse, overall, is operated. This determination led to the concept of "ganging" turbine units in conjunction with operating turbines in fish mode. Ganging units is defined as concentrating operating turbines into blocks of adjacent units, thus reducing the edge-effect in regard to predation by fish and birds on salmonid smolts as smolts exit a turbine's draft tube (LGL Limited, 2003).

When turbines are required, ganged units are operated first and shutdown last because it has been demonstrated that juvenile salmonids are drawn to passing through turbines closest to the spillway and that their survival is highest when passing through blocks of turbines being operated in Fish Mode.

Turbines furthest from the spillways (Unit 1 at Wanapum and Unit 10 at Priest Rapids) are the first turbines to discontinue operation during daylight hours when the powerhouses are operating at less than full capacity during juvenile and adult fish-migration seasons. The discharge from these turbines may adversely affect adult salmonids' ability to efficiently locate the entrances to the adult fishways adjacent to these turbine discharges.

2.1 Turbine Operation and Inspection Schedule

Turbines are operated as needed for producing electricity and do not have an operation season or schedule. Turbines are inspected as necessary based on the number of hours operated and other associated stresses.

3.0 Description of Wanapum Future Unit Fish Bypass Operating Criteria and Protocols

The WFB is the result of collaborative effort by the PRCC and Grant PUD's design team, using the DPAAP, to develop a new non-turbine passage measure to replace the previous voluntary fish-spill program at Wanapum Dam. The construction completion and initial operation of the WFB occurred in spring 2008. Based on computer and physical modeling, a bypass flow of 20 kcfs was anticipated to be sufficient to achieve survival standards for juvenile fish passage at Wanapum Dam. The WFB operation schedule is concurrent with the annual spring and summer juvenile fish out-migration seasons. The WFB was designed to operate to produce skimming flow conditions exhibited by the physical models (Figure 1) at 20 kcfs for tailwater elevations between 488.0 and 498.0 feet. To bring the WFB back within its design operating condition when river levels fall below these tailwater parameters, flow through the WFB must be reduced, or project operations modified, to maintain tailwater within design conditions. This exact scenario was experienced in the first week of operation of the WFB. After consultation with the PRCC, protocols were established for 2008 when early season low-river flows precluded maintaining tailwater elevations within the WFB design range. In order to operate the WFB at 20 kcfs and maintain skimming flow there must be a minimum tailwater elevation of 488.0 ft. at

Wanapum Dam. For 2008, the PRCC established that if tailwater is dropped lower than 488.0 ft., or tailwater discharge was less than 60 kcfs, the WFB would be operated at 15 kcfs (Figure 1). With a tailwater below 488.0 elevation, the outflow from the WFB (at 20 kcfs) becomes unstable and starts to undulate, causing a condition that is believed to be less conducive for migrating juvenile smolts and also possibly producing greater total dissolved gas levels. At this lower tailwater elevation, when the outflow from the WFB is reduced, this undulating jet of water is returned to a surface skimming flow, which is better for fish passage. Grant PUD will maintain the Wanapum tailwater elevations to stay within the range of 488.0 to 498.0 feet during the salmonid out-migration season during non-extreme river condition periods. Based on biological test results and operational verification that field conditions match conditions predicted by the physical model (Figure 1), permanent WFB operational criteria will be developed. Until permanent operational criteria are established and the model data from Figure 1 are ground-truthed, Grant PUD will continue to consult with the PRCC on WFB operations.

The WFB was designed to operate at different flow volumes (20, 15, 10, 5 and 2.5 kcfs), although the PRCC has not discussed extended operation of the WFB at flow less than 20 kcfs., except for those periods that the Wanapum tailrace elevation fell below 488 ft. Grant PUD may propose to the PRCC that the WFB be operated at flows less than 20 kcfs if study data indicate that greater fish collection efficiencies and/or greater passage survival could be achieved with the WFB under certain river conditions.

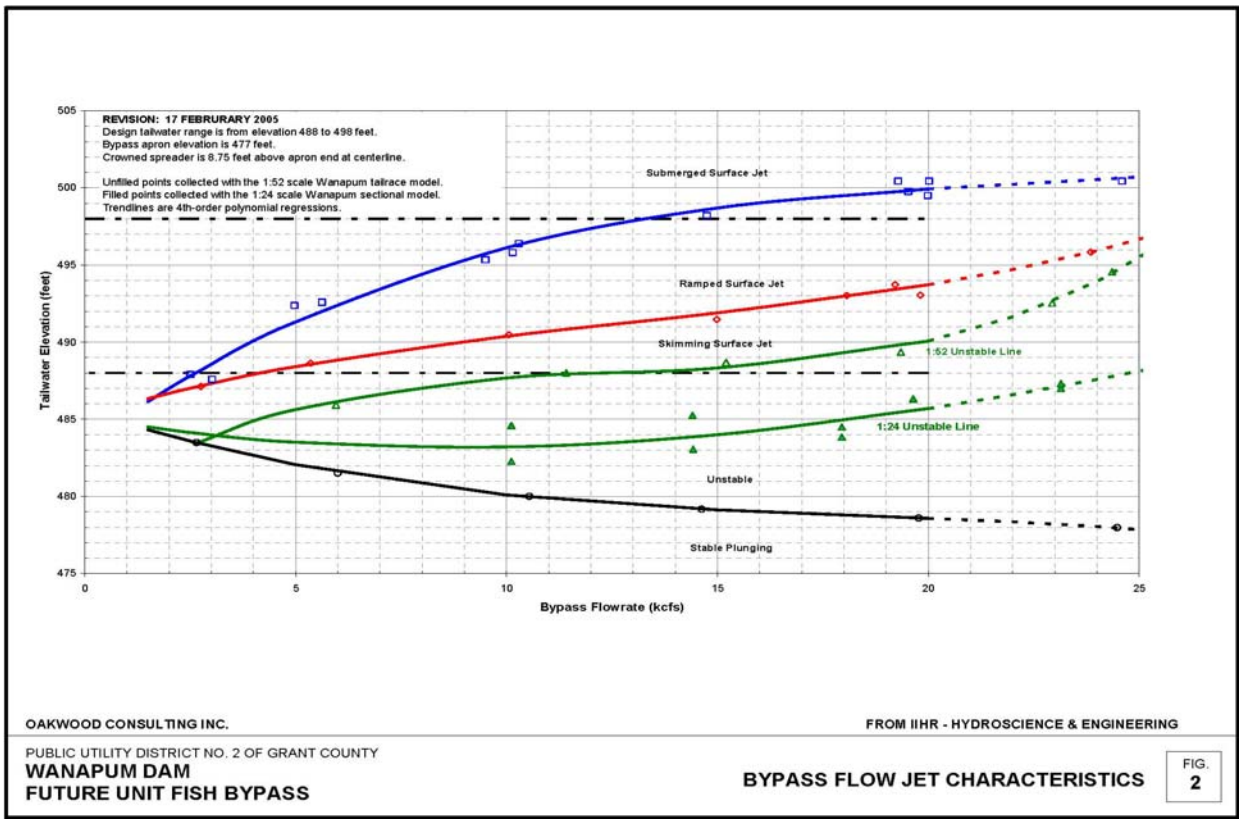

Figure 1 Exit flow characteristics of Wanapum Future Unit Fish Bypass based on tailwater elevations.

3.1 Wanapum Future Unit Fish Bypass Operation and Inspection Schedule

The WFB is operated continuously during the juvenile salmonid out-migration season each year (typically mid- to late-April through mid- to late-August). The WFB is inspected for necessary maintenance annually during its non-operation season of mid- to late-August through mid- to late-April.

4.0 Description of Spillways Operating Criteria and Protocols

In 2008, the PRCC was in consensus that all fish spill at Wanapum Dam would be passed through the WFB to test whether this route was a better passage route than tainter gate fish spill at Wanapum Dam. Testing has indicated that the Wanapum tainter gate spill has lower passage survival rates for yearling Chinook and steelhead than some of the passage routes at the dam. Grant PUD is in the process of developing a modified design for the Wanapum tainter gate seals, which could reduce injury and mortality through the Wanapum tainter gates. Per the Settlement Agreement, until performance standards have been met for all Settlement Agreement anadromous fish species, tainter gate spill must remain a viable passage alternative at Wanapum Dam. In the event of inadvertent spill, water is spilled through the tainter gates in a manner agreed upon by the PRCC spill representatives. Examples of typical spill protocols are given in Table 1 and Table 2 of Appendix A. Table 3 in Appendix A is an example of the spill operation schedule at Wanapum Dam during 2009.

Similarly, the PRCC was in consensus that all fish spill at Priest Rapids Dam during 2009 would be passed over the top-spill bulkheads at gates 19 and 20, providing an average of 14 kcfs, and through tainter gate 21, providing an average of 7 kcfs, and through the open sluice gate, providing about 2 kcfs. This was the result of the adaptive management process that developed alternative spill passage for downstream migrants. In 2007, it was observed that with only the top-spill bulkhead operating (approx. 14 kcfs) that 12 – 18 % fish collection efficiency (FCE) was being achieved (depending on fish species). Through Computational Fluid Dynamics (CFD) modeling and additional physical modeling, it appeared that the FCE could be increased with the addition of tainter spill (7 kcfs) from gate 21 and the sluice way (gate 22) operated (2 kcfs) to the 14 kcfs surface spill produced by the top-spill bulkhead. This “fish passage operations program” was presented to the PRCC and consensus was received to use this “fish passage operations program” for the 2009 study season of the Priest Rapids Top-Spill Fish Passage. During the 2010 testing season, the Priest Rapids Top-Spill Operations Configuration will be modified, based on the observation that for the years 2008 and 2009, the ice/trash sluiceway had the lowest passage route survival rate of the four different passage routes associated with the Top-Spill Operations Configuration. The 2010 “modification” will be the “pinning” of the surface-spill sluiceway closed and operating that same spill bay (TG-22) as a bottom-spill gate. The 2010 acoustic-tag behavior study plan was approved by the PRCC November 23, 2009.

This is an on-going process, with the final design/conclusion for a non-turbine passage route at Priest Rapids Dam not yet determined. Per the Settlement Agreement, until performance standards have been met for all Settlement Agreement anadromous fish species, tainter gate spill must remain a viable passage alternative at Priest Rapids Dam, where tainter gate spill provides a safer passage route than at Wanapum Dam. In the event of inadvertent spill, water is spilled through the tainter gates in accordance with the protocols. Table 2 in Appendix A summarizes the spill operation schedule at Priest Rapids Dam for 2009.

In consultation with the PRCC fish spill representatives, smolt index counts from the Rock Island Smolt Monitoring Station are used to determine when annual spring fish spill at both developments is initiated (before 2.5 percent of the juvenile spring migrants have passed the Project - typically mid- to late-April) and also when summer fish spill is terminated (when over 95.0 percent of the summer juvenile migrants have passed; typically mid- to late-August). Typically, the end of the spring fish spill overlaps with the beginning of the summer fish spill, providing continuous fish spill from April to August.

4.1 Spillway Operation and Inspection Schedule

The spillways are operated on the schedule outlined above during the juvenile salmonid out-migration season, and are operated on an as-needed basis during the remainder of the year. Inspections typically occur during the late summer/early fall low river-flow period, with any necessary maintenance occurring during the low river-flow winter months when the tainter gates are unlikely to be needed.

5.0 Description of Sluiceways Operating Criteria and Protocols

The sluiceway at Wanapum Dam is fully opened to provide an adult salmonid fish fall-back route when the WFB is closed at the end of the juvenile salmonid out-migration season, typically in mid- to late-August. The WFB serves as the adult salmonid fall-back route while it is in operation. The sluiceway remains open until November 15 of each year. The WFB can be operated to provide an alternate adult fall-back route.

The sluiceway at Priest Rapids Dam is fully opened following the end of the salmonid out-migration, typically in mid- to late-August, to provide an adult salmonid fall-back route, and remains fully open for adult fall-back until November 15 of each year.

5.1 Sluiceway Operation and Inspection Schedule

The sluiceways are operated on the schedule outlined in the above section. Inspections occur during the non-operation periods.

6.0 Description of Adult Fishways Operating Criteria, Protocols, and Schedule

The Priest Rapids Project Adult Fishway Improvements Annual Report 2009 is attached as Appendix B. This report describes fishway operations, maintenance issues, and inspection results from 2009.

Fishway ladders are operated with a water depth over weirs of 1.0-1.2 ft. Debris from trash racks and picketed leads is quickly removed from ladder exits when water surface differentials exceed 0.5 ft., or as debris begins building up at the exit from the fish ladder. All submerged orifices and overflow weir crests are cleared of debris prior to the adult fish migration season and are kept free of debris during the fish-passage season. Fishway entrances are operated with a head differential range of 1.0 to 2.0 ft.

Grant PUD operates the fishways within the criteria ranges outlined above, and targeted heads are maintained whenever possible. When targeted heads cannot be maintained, the fishways are operated at maximum capable output to meet entrance and channel flow requirements.

Collection channel transport velocities of 1.5 to 4.0 feet per second (fps) (target 2.0 fps) are maintained through the powerhouse collection channels and through the lower end of the fish

ladders. All collection channel orifice gates remain closed during the adult fish-passage season, per agreement with the PRCC.

Fishway inspections are conducted by a project operator at least once per day (walk-through) to ensure that fish facilities are operating within criteria limits. A daily log of the inspections is compared with the computerized printout to assure correct calibration of the fishway control system. At the discretion of NOAA Fisheries or Fish Passage Center (FPC), at least one inspection of the fishways is conducted by one of these agencies each month during the adult fish-passage season (April 15 – November 15). Inspection results are made available to Grant PUD, and problem-area solutions are immediately coordinated with a Grant PUD biologist or operations chief after the inspection is completed. The FPC coordinates the inspection program and is contacted if any fish facility problems occur.

Table 1 Entrance Criteria for Priest Rapids Dam Powerhouse and Spillway Entrances

Gate	Targeted Head (ft)	Gate Depth (ft)
LSE-2	1.2	Slotted Gate (always open)
LEW-3	1.2	8.5 ± 0.5 ft (Backup Gate only)
LSE-4	1.5	Slotted Gate (always open)
LEW-6	1.5	8.8 ± 0.5 ft (Backup Gate only)
RSE-1	1.5	Slotted Gate (always open)
REW-2	1.5	7.5 ± 0.5 ft (Backup Gate only)

Note:
1. Head represents water level indicator reading immediately above the entrance minus the water level indicator reading in tailwater.
2. Gate depth represents the tailwater reading minus the entrance weir crest reading.
3. The channel surface elevation differential from LSE-4 to LSE-2 should be at or greater than 0.3 ft.
4. The main slotted entrance gates will be used for primary adult passage and the mechanical backup gates will be used only in an emergency.
5. Verification of electronic water level indicator accuracy will be made via readings from staff gauges during monthly inspections at the discretion of the inspector.

Table 2 Entrance Criteria for Wanapum Powerhouse and Spillway Entrances

Gate	Targeted Head (ft)	Gate Depth (ft)
SE-2	1.5	Slotted Gate (always open)
SE-1	1.5	(Backup Slotted Gate only)
SE-3	1.2	Slotted Gate (always open)
RSE-2	1.2	Slotted Gate (always open)
REW-1	1.2	(Backup Gate only)

Note:
1. Head represents water level indicator reading immediately above the entrance minus the water level indicator reading in tailwater.
2. The channel surface elevation differential from SE-2 to SE-3 should be at or greater than 0.3 feet.
3. Verification of electronic water level indicator accuracy will be made via readings from staff gauges during monthly inspections at the discretion of the inspector.

Both adult fishways at both developments are typically operated continually from April 1 through November 30 of each year. Exceptions to this protocol are coordinated with NOAA Fisheries and FPC. In the event of a scheduled or emergency fishway maintenance outage, at least one fishway at the development remains in operation at all times.

6.1 Description of the Left-bank Adult Fishway at Priest Rapids Dam

The left-bank adult fishway at Priest Rapids Dam is composed of a powerhouse collection channel and the connecting east shore ladder. The ladder has two fish entrances, left slotted entrance 4/left entrance weir 5 (LSE4/LEW5 and LEW6-7) but only one (LSE4/LEW5) is kept open. LEW4 was changed to a slotted entrance in 1998 (now designated as LSE4), allowing LEW6 to be a backup mechanical gate. LEW5's operation was incorporated and automated to assist with operation of LSE4 and water velocity manipulation in the collection channel. The collection channel consists of three main entrances (LEW1, LSE2, and LEW3) at the channel's west end and 18 leaf gate orifices (OG1-18). LEW2 was changed to a slotted entrance in 1999 and consequently is now designated as LSE2. Only one collection channel main entrance (LSE2) remains open during the adult-passage season. All collection channel orifice gates remain closed during the adult passage season. LEW3 serves as a backup mechanical gate to LSE2. The auxiliary water at Priest Rapids Dam is comprised of a combination of gravity flow originating from the Gravity Intake Gate (GIG) and pumped water from five pumps in the tailrace. Both gravity and pumped water enter the attraction water supply pool before being directed into left-bank diffusion chambers (LDC) in the collection channel (LDC1-24), junction pool (LDC25-31), ladder (LDC32-45) and attraction water supply conduit. Butterfly valves control auxiliary water to LDC1-32 and chimneys provide auxiliary water to LDC33-45. At the ladder exit, water to diffusion chamber LDC46 is supplied from the forebay by butterfly valve LV33. Grant PUD operates the diffusion chambers to keep the ladder within required criteria during the fish-passage season.

6.2 Description of the Right-bank Adult Fishway at Priest Rapids Dam

The section of the fishway adjacent to the spillway has three fish entrances (RSE1, REW2 and REW3) but only one, RSE1, is used. REW1 was changed to a slotted entrance (RSE1) in 1999,

while REW2 remains as a backup mechanical gate. REW3 faces the spillway and is bulkheaded. Right-bank auxiliary water at Priest Rapids Dam is supplied by the attraction water supply conduit running the length of the spillway. The water supply conduit feeds the right-bank auxiliary water supply pool. The right-bank auxiliary water supply pool can be isolated using the conduit closure gate (CCG) located on the right bank. The two main entrance diffusion chambers (RDC1 and 2) and diffusion chambers RDC3-5 are all fed by the right-bank auxiliary water supply pool through butterfly valves. The remaining lower ladder diffusion chambers (RDC6-19) are fed from chimneys in the auxiliary water supply pool. Upper diffusion chamber RDC20 is fed by the forebay through butterfly valve RV9. Grant PUD operates the diffusion chambers to keep the ladder within required criteria during the fish passage season.

6.3 Description of the Left-bank Adult Fishway at Wanapum Dam

The left-bank adult fishway at Wanapum Dam is comprised of a powerhouse collection channel and the connecting east-shore ladder. The ladder has two slotted fish entrances (SE1 and SE2) but only one (SE2) is kept open. The collection channel consists of 20 leaf-gate orifices (OG1-20). The SE3 entrance is now located at the OG-20, and it will remain open during the adult-passage season. All collection channel orifice gates remain closed during the adult passage season. The auxiliary water at Wanapum Dam is comprised of a combination of gravity flow originating from the forebay through two inline valves, and pumped water from two turbine-driven pumps drawing water from the tailrace. Both gravity and pumped water empty into the attraction water supply channel before being directed into left-bank diffusion chambers (LDC) in the powerhouse collection channel (LDC27-50), junction pool (LDC24-26), and ladder (LDC2-23). Butterfly valves control auxiliary water to LDC25-50 and chimneys control auxiliary water to LDC2-24. At the ladder exit, butterfly valve LV7 provides forebay gravity water to diffusion chamber LDC1. Grant PUD operates the diffusion chambers to keep the ladder within required fishway criteria during the fish passage period.

6.4 Description of the Right-bank Adult Fishway at Wanapum Dam

The fishway, adjacent to the spillway, has three fish entrances (REW1, RSE2 and REW3) but only one (RSE2) is used. REW2 was changed to a slotted entrance (RSE2) in 1996, while REW1 remains as a backup mechanical gate. REW3 faces the spillway and is bulkheaded. Right-bank auxiliary water at Wanapum Dam is supplied by the gravity supply conduit through two inline valves fed by the forebay. The lower diffusion chambers (RDC25-32) are fed by individual butterfly valves from the attraction water supply channel. Water is provided to the remaining lower ladder diffusion chambers (RDC2-24) by attraction water supply channel chimney overflow. The upper ladder diffusion chamber RDC1 is fed by the forebay through butterfly valves RV9 and 10. Grant PUD operates the diffusion chambers to keep the ladder within required fishway criteria during the fish passage period.

6.5 Fishways Inspections and Dewatering

Dewatering of the fishways for inspection and maintenance is conducted during the periods of minimum fish migration. In order to shorten the ladder shutdown periods, dewatering operations are carefully planned in advance. A schedule for the inspection and maintenance is worked out in cooperation with the PRCC, PRFF, and the FPC. The required frequency of the dewatering for maintenance is determined from Grant PUD's experience gained through yearly inspections.

During all dewaterings that may involve fish handling, trained personnel are present to provide technical guidance and assure sound fish handling. Every effort is made to remove fish prior to the system becoming fully dewatered. All adult anadromous species recovered are released upstream of the dam.

6.6 Normal Winter Maintenance Period (December 1 – February 28)

The fishways may be dewatered to allow annual maintenance of fish facility equipment, including pumps, diffuser gratings, valves, and orifice and entrance gates as necessary to assure their readiness during the adult fish-migration period.

All fishway dewaterings are recorded and a report is completed by the project biologist or technician. Fish biologists or technicians are present at all dewaterings to assure proper fish handling procedures are followed.

A copy of the proposed winter maintenance is made available to the PRCC and PRFF by November 1 each year. Any expected deviation from the normal winter maintenance period is listed. Changes to the normal outage period are coordinated with NOAA Fisheries and FPC.

6.7 Scheduled Maintenance

Maintenance which requires dewatering, or that will have a significant effect on fish passage, is done during the winter maintenance period of December 1 through February 28. Maintenance of facilities that does not affect fish passage may be conducted during the rest of the year. Concurrent outages of both fishways are avoided whenever possible to provide an upstream fish passage route at the dams at all times. When facilities are not being maintained during the winter maintenance period, they are operated according to the normal operating criteria, unless otherwise coordinated with NOAA Fisheries, FPC, PRCC, and the PRFF.

6.8 Unscheduled Maintenance

Unscheduled maintenance that significantly impacts the operation of a fish-passage facility is coordinated with FPC, NOAA Fisheries, PRCC, and the PRFF. The decision on whether to dewater the ladder and make repairs during the fish passage season or wait until the winter maintenance period is made after consultation with the FPC, NOAA Fisheries, PRCC, and the PRFF. If part of a fish-passage facility malfunctions or is damaged during the fish-passage season and the facility can still be operated within criteria without any detrimental effects on fish passage, repairs are not conducted until the winter maintenance period or until minimal numbers of fish are passing the dam. If part of a facility that may significantly impact fish passage is damaged or malfunctions, it is repaired as soon as possible.

6.9 Performance Standards for Adult Survival and Fishways Operation

As required in Appendix B of the Order Issuing New License, Fishways Prescriptions, Article 6, Grant PUD is progressing toward achieving a minimum 91% combined adult and juvenile salmonid survival performance standard at the Priest Rapids and Wanapum developments, and has the passage measures in place that are expected to achieve this performance standard by 2010. Article 6 recognizes that it is not currently possible to measure the 91% combined juvenile and adult survival standard because the adult standard is currently not measurable. However, Grant PUD is using smolt survival studies to evaluate progress toward meeting 95% juvenile dam-passage survival and 93% juvenile project-passage survival.

Project fishways are designed and operated in a manner consistent with guidelines described in the National Marine Fisheries Service's Anadromous Salmonid Passage Facility Design manual. Concurrence on Grant PUD's annual Fishery Operations Plan is received from FPC, NOAA Fisheries, PRCC, and the PRFF prior to the beginning of the adult fish-passage season.

6.10 Adult Pacific Lamprey Passage Improvements

The goals and objectives of Grant PUD's Pacific Lamprey Management Plan will be achieved through a series of protection, mitigation, and enhancement (PME) measures. PME measure 4.2.5 of the plan requires structural modifications to the fishway diffusion gratings at Priest Rapids Dam (LGL et al, 2009). Flat aluminum plating will be installed on the edges of diffusion grating that extends to the vertical wall of the fishway. In addition, Grant PUD will use the same plating to cover the fishway floor through orifices in the weirs, and to create ramps at orifices where orifice bottoms are above the fishway floor.

7.0 Priest Rapids Dam Fishway Water Supply

Under the terms and conditions of its operating license, Grant PUD is responsible for the requirements of License Article 403 to file with FERC approval a plan for installing and operating a tailrace pumping system for each Priest Rapids Dam fishway water supply.

Grant PUD has initiated research, which includes model testing, to determine the proper design flow requirements under the current fishway configuration at Priest Rapids Dam. This research includes evaluation of multiple pumping configurations which will result in an optimized pump house configuration and identification of the recommended design based on economic feasibility.

Due to the additional time needed to research feasible options and to continue discussions with the PRCC related anadromous fish passage issues, Grant PUD requested an extension to October 16, 2010 to complete testing and identify the proper design before completing and filing its plan required under Article 403 of its FERC license.

List of Literature

Grant PUD (Public Utility District No. 2 of Grant County). 2006. Priest Rapids Project Salmon and Steelhead Settlement Agreement, FERC Project No. 2114, Ephrata, Washington.

Federal Energy Regulatory Commission. 2008. Order Issuing New License for Public Utility No. 2 of Grant County, WA, 123 FERC ¶61,049.

LGL, Limited. 2003. Chinook Smolt Survival at Wanapum and Priest Rapids Dams with Various Spill-Configurations, 2003. Report for Public Utility District No. 2 of Grant County, Washington.

LGL, Limited. 2009. Assessment of Pacific Lamprey Behavior and Passage Efficiency at Priest Rapids and Wanapum Dams. October 28, 2009.

NMFS (National Marine Fisheries Service). 2008. Biological Opinion and Magnuson-Steven Fishery Conservation and Management Act. New license for the Priest Rapids hydroelectric Project. February 1, 2008.

USFWS (U.S. Fish and Wildlife Service). 2008. Fishway Prescriptions Pursuant to Section 18 of the FPA for Salmon and Steelhead filed May 26, 2005, modified February 20, 2007, clarified March 21, 2008.

Voskuilen, R. 2003. Fish Passage Alternative Study for the Priest Rapids Project. Final Report. Prepared for Public Utility District No. 2 of Grant County, Ephrata, Washington.

WDOE (Washington Department of Ecology). 2008. Section 401 Water Quality Certification Terms and Conditions for the Priest Rapids Hydroelectric Project, FERC Project No. 2114, Spokane, Washington.

Appendix A
Priest Rapids Project 2009 Spill Summary

Table 1 Summary of 2009 Fish-spill Operations at Wanapum Dam

Date	Spill Program	Purpose
April 24, 2009	***Spring Spill Initiated***	
April 30-June 15, 2008	WFB (Open 24 Hours/Day)	RPA 1 and terms and conditions of the 2008 Biological Opinion and as approved by PRCC
June 15, 2006	***End of Spring Spill/ Summer Spill Initiated***	
June 15-Aug.19, 2009	WFB (Open 24 Hours/Day)	Priest Rapids Project Salmon and Steelhead Settlement Agreement and as approved by PRCC
August 19, 2009	***End of Summer Spill***	

Table 2 Summary of 2009 Fish-spill Operations at Priest Rapids Dam

Date	Spill Program	Purpose
April 27, 2009	***Spring Spill Initiated***	
April 30-June 15, 2006	Prototype top-spill test: spill-gate 19-20 full open; spill gate open 5 ft; + sluiceway	RPA 1 and terms and conditions of the 2008 Biological Opinion and as approved by PRCC
June 15, 2008	***End of Spring Spill/ Summer Spill Initiated***	
June 15-Aug. 20, 2009	Prototype top-spill test: spill-gate 19-20 full open; spill gate open 5 ft; + sluiceway	Priest Rapids Project Salmon and Steelhead Settlement Agreement and as approved by PRCC
August 20, 2009	***End of Summer Spill***	

Table 3 Wanapum Dam Daytime Inadvertent Spill Operations Protocol in 2009

2009 WANAPUM DAM SPILL GATE OPERATIONS FOR INADVERTENT SPILL

Date: June 11, 2009

Total Spill In KCFS	Gate Number												Sluice Gate	Total Opening In Feet
	1	2	3	4	5	6	7	8	9	10	11	12		
0.0												Close	Close	0
2.2			1									Close	Close	1
4.4			1	1								Close	Close	2
6.6			1	1	1							Close	Close	3
8.8			1	1	1	1						Close	Close	4
11.0			1	1	1	1	1					Close	Close	5
13.2			1	1	1	1	1	1				Close	Close	6
15.4			1	1	1	1	1	1	1			Close	Close	7
17.6			1	2	1	1	1	1	1			Close	Close	8
19.8			1	2	1	2	1	1	1			Close	Close	9
22.0			1	2	2	2	1	1	1			Close	Close	10
24.2			1	2	2	2	2	1	1			Close	Close	11
26.4			1	2	2	2	2	2	1			Close	Close	12
28.6			1	2	2	2	2	2	2			Close	Close	13
30.8			1	2	2	2	2	2	2	1		Close	Close	14
33.0			1	2	2	2	2	2	2	2		Close	Close	15
35.2			1	2	3	2	2	2	2	2		Close	Close	16
37.4			1	2	3	2	3	2	2	2		Close	Close	17
39.6			1	2	3	2	3	2	3	2		Close	Close	18
41.8			1	2	3	3	3	2	3	2		Close	Close	19
44.0			1	2	3	3	3	3	3	2		Close	Close	20
46.2			1	3	3	3	3	3	3	2		Close	Close	21
48.4			1	3	3	3	3	3	3	2	1	Close	Close	22
50.6			1	3	3	3	3	3	3	3	1	Close	Close	23
52.8			1	3	3	3	3	3	3	3	2	Close	Close	24
55.0			2	3	3	3	3	3	3	3	2	Close	Close	25
57.2		1	2	3	3	3	3	3	3	3	2	Close	Close	26
59.4		2	2	3	3	3	3	3	3	3	2	Close	Close	27
61.6		2	3	3	3	3	3	3	3	3	2	Close	Close	28
63.8		2	3	3	3	4	3	3	3	3	2	Close	Close	29
66.0		2	3	3	3	4	3	4	3	3	2	Close	Close	30
68.2		2	3	4	3	4	3	4	3	3	2	Close	Close	31
70.4		2	3	4	3	4	3	4	3	4	2	Close	Close	32
72.6		2	3	4	3	4	4	4	3	4	2	Close	Close	33
74.8		2	3	4	3	4	4	4	4	4	2	Close	Close	34
77.0		2	3	4	4	4	4	4	4	4	2	Close	Close	35

2009 WANAPUM DAM SPILL GATE OPERATIONS FOR INADVERTENT SPILL

Date: June 11, 2009

Total Spill In KCFS	Gate Number												Sluice Gate	Total Opening In Feet
	1	2	3	4	5	6	7	8	9	10	11	12		
79.2		2	3	5	4	4	4	4	4	4	2	Close	Close	36
81.4		2	4	5	4	4	4	4	4	4	2	Close	Close	37
83.6		2	4	5	4	5	4	4	4	4	2	Close	Close	38
85.8		2	4	5	4	5	4	4	4	4	3	Close	Close	39
88.0		2	4	5	4	5	4	5	4	4	3	Close	Close	40
90.2		2	4	5	4	5	4	5	4	5	3	Close	Close	41
92.4		2	4	5	4	5	5	5	4	5	3	Close	Close	42
94.6		3	4	5	4	5	5	5	4	5	3	Close	Close	43
96.8		3	4	5	4	5	5	5	5	5	3	Close	Close	44
99.0		3	4	5	5	5	5	5	5	5	3	Close	Close	45
101.2		3	4	5	5	6	5	5	5	5	3	Close	Close	46
103.4		3	4	5	5	6	5	6	5	5	3	Close	Close	47
105.6		3	4	6	5	6	5	6	5	5	3	Close	Close	48
107.8		3	4	6	5	6	6	6	5	5	3	Close	Close	49
110.0		3	5	6	5	6	6	6	5	5	3	Close	Close	50
112.2		3	5	6	5	6	6	6	5	6	3	Close	Close	51
114.4		3	5	6	6	6	6	6	5	6	3	Close	Close	52
116.6		3	5	6	6	6	6	6	6	6	3	Close	Close	53
118.8		3	5	6	7	6	6	6	6	6	3	Close	Close	54
121.0		3	5	6	7	6	6	6	7	6	3	Close	Close	55
123.2		3	5	6	7	6	7	6	7	6	3	Close	Close	56
125.4		3	5	6	7	7	7	6	7	6	3	Close	Close	57
127.6		3	5	6	7	7	7	7	7	6	3	Close	Close	58
129.8		3	6	6	7	7	7	7	7	6	3	Close	Close	59
132.0		3	6	7	7	7	7	7	7	6	3	Close	Close	60
134.2		4	6	7	7	7	7	7	7	6	3	Close	Close	61
136.4		4	6	7	8	7	7	7	7	6	3	Close	Close	62
138.6		4	6	7	8	7	8	7	7	6	3	Close	Close	63
140.8		4	6	7	8	7	8	7	8	6	3	Close	Close	64
143.0		4	6	7	8	8	8	7	8	6	3	Close	Close	65
145.2		4	6	7	8	8	8	8	8	6	3	Close	Close	66
147.4		4	6	8	8	8	8	8	8	6	3	Close	Close	67
149.6		4	6	8	8	9	8	8	8	6	3	Close	Close	68
151.8		4	6	8	8	9	8	9	8	6	3	Close	Close	69
154.0		4	6	8	8	9	9	9	8	6	3	Close	Close	70

2009 WANAPUM DAM SPILL GATE OPERATIONS FOR INADVERTENT SPILL

Date: June 11, 2009

Total Spill In KCFS	Gate Number												Sluice Gate	Total Opening In Feet
	1	2	3	4	5	6	7	8	9	10	11	12		
156.2		4	6	8	9	9	9	9	8	6	3	Close	Close	71
158.4		4	6	8	9	9	9	9	8	7	3	Close	Close	72
160.6		4	6	8	9	9	10	9	8	7	3	Close	Close	73
162.8		4	6	8	10	9	10	9	8	7	3	Close	Close	74
165.0		4	6	8	10	9	10	9	9	7	3	Close	Close	75
167.2		4	6	8	10	9	10	9	10	7	3	Close	Close	76
169.4		4	6	8	10	10	10	9	10	7	3	Close	Close	77
171.6		4	6	8	10	10	10	10	10	7	3	Close	Close	78
173.8		4	6	8	10	11	10	10	10	7	3	Close	Close	79
176.0		4	6	8	10	11	10	11	10	7	3	Close	Close	80
178.2		4	6	8	10	11	11	11	10	7	3	Close	Close	81
180.4		4	6	8	10	12	11	11	10	7	3	Close	Close	82
182.6		4	6	8	10	12	12	11	10	7	3	Close	Close	83
184.8		4	6	8	10	12	12	12	10	7	3	Close	Close	84
187.0		4	6	8	10	12	13	12	10	7	3	Close	Close	85
189.2		4	6	8	10	12	13	13	10	7	3	Close	Close	86
191.2		4	6	9	10	12	13	13	10	7	3	Close	Close	87
193.2		4	6	9	10	12	13	13	11	7	3	Close	Close	88
195.2		4	6	9	11	12	13	13	11	7	3	Close	Close	89
197.2		4	6	9	12	12	13	13	11	7	3	Close	Close	90

Note:

1. Spill based on reservoir elevation of 570 feet.
2. Spillway with spill deflector (flip-lip) functioning in spillbays 1-11.
3. Spillbay discharge based upon the June 23, 1999 revised spillway discharge table.
4. Deflector performance is assumed lost after 4 feet opening.
5. "Day Time" is 0700 hr - 1900 hr.

Table 4 Wanapum Dam Nighttime Inadvertent Spill Operations Protocol in 2009

2009 WANAPUM DAM SPILL GATE OPERATIONS FOR INADVERTENT SPILL

During "Night Time" Fish Spill

Total Spill In KCFS	Gate Number												Sluice Gate	Total Opening In Feet
	1	2	3	4	5	6	7	8	9	10	11	12		
2.2						1						Closed	Closed	1
4.4					1	1						Closed	Closed	2
6.6					1	1	1					Closed	Closed	3
8.8				1	1	1	1					Closed	Closed	4
11.0				1	1	1	1	1				Closed	Closed	5
13.2				1	1	1	1	1	1			Closed	Closed	6
15.4				1	1	2	1	1	1			Closed	Closed	7
17.6				1	2	2	1	1	1			Closed	Closed	8
19.8				1	2	2	2	1	1			Closed	Closed	9
22.0				1	2	3	2	1	1			Closed	Closed	10
24.2				1	2	3	2	2	1			Closed	Closed	11
26.4				1	2	3	3	2	1			Closed	Closed	12
28.6			1	2	2	3	3	1	1			Closed	Closed	13
30.8			1	2	2	3	3	1	1	1		Closed	Closed	14
33.0			1	2	2	3	3	1	1	1	1	Closed	Closed	15
35.2			1	2	2	3	3	2	1	1	1	Closed	Closed	16
37.4			1	2	3	3	3	2	1	1	1	Closed	Closed	17
39.6			1	2	3	3	3	2	2	1	1	Closed	Closed	18
41.8			1	2	3	4	3	2	2	1	1	Closed	Closed	19
44.0			1	2	3	4	3	3	2	1	1	Closed	Closed	20
46.2		1	1	2	3	4	3	3	2	1	1	Closed	Closed	21
48.4		1	1	2	3	4	4	3	2	1	1	Closed	Closed	22
50.6		1	1	2	3	4	4	4	2	1	1	Closed	Closed	23
52.8		1	1	2	3	4	4	4	3	1	1	Closed	Closed	24
55.0		1	1	3	3	4	4	4	3	1	1	Closed	Closed	25
57.2		1	1	3	4	4	4	4	3	1	1	Closed	Closed	26
59.4		1	2	3	4	4	4	4	3	1	1	Closed	Closed	27
61.6		1	2	3	4	4	4	4	3	2	1	Closed	Closed	28
63.8		1	2	3	4	4	4	4	4	2	1	Closed	Closed	29
66.0		1	2	3	4	4	4	5	4	2	1	Closed	Closed	30
68.2		1	2	3	4	4	5	5	4	2	1	Closed	Closed	31
70.4		1	2	3	4	4	5	5	4	3	1	Closed	Closed	32
72.6		1	2	3	5	4	5	5	4	3	1	Closed	Closed	33
74.8		1	2	3	5	4	5	5	4	3	2	Closed	Closed	34
77.0		1	2	3	5	4	5	5	4	4	2	Closed	Closed	35

2009 WANAPUM DAM SPILL GATE OPERATIONS FOR INADVERTENT SPILL

During "Night Time" Fish Spill

Total Spill In KCFS	Gate Number												Sluice Gate	Total Opening In Feet
	1	2	3	4	5	6	7	8	9	10	11	12		
79.2		1	2	4	5	4	5	5	4	4	2	Closed	Closed	36
81.4		1	2	4	5	4	5	5	5	4	2	Closed	Closed	37
83.6		1	2	4	5	5	5	5	5	4	2	Closed	Closed	38
85.8		2	2	4	5	5	5	5	5	4	2	Closed	Closed	39
88.0		2	2	4	5	5	5	5	5	5	2	Closed	Closed	40
90.2		2	3	4	5	5	5	5	5	5	2	Closed	Closed	41
92.4		2	3	4	5	5	5	5	6	5	2	Closed	Closed	42
94.6		2	3	4	5	5	6	5	6	5	2	Closed	Closed	43
96.8		2	3	4	6	5	6	5	6	5	2	Closed	Closed	44
99.0		2	3	5	6	5	6	5	6	5	2	Closed	Closed	45
101.2		2	3	5	6	6	6	5	6	5	2	Closed	Closed	46
103.4		2	4	5	6	6	6	5	6	5	2	Closed	Closed	47
105.6		3	4	5	6	6	6	5	6	5	2	Closed	Closed	48
107.8		3	4	5	6	6	6	6	6	5	2	Closed	Closed	49
110.0		3	4	6	6	6	6	6	6	5	2	Closed	Closed	50
112.2		3	4	6	6	6	6	6	6	5	3	Closed	Closed	51
114.4		3	5	6	6	6	6	6	6	5	3	Closed	Closed	52
116.6		3	5	6	7	6	6	6	6	5	3	Closed	Closed	53
118.8		3	5	6	7	6	6	6	6	6	3	Closed	Closed	54
121.0		3	6	6	7	6	6	6	6	6	3	Closed	Closed	55
123.2		3	6	6	7	6	7	6	6	6	3	Closed	Closed	56
125.4		3	6	6	7	6	7	6	7	6	3	Closed	Closed	57
127.6		3	6	6	7	7	7	6	7	6	3	Closed	Closed	58
129.8		3	6	6	7	7	7	7	7	6	3	Closed	Closed	59
132.0		3	6	7	7	7	7	7	7	6	3	Closed	Closed	60
134.2		3	6	7	7	8	7	7	7	6	3	Closed	Closed	61
136.4		3	6	7	7	8	7	8	7	6	3	Closed	Closed	62
138.6		3	6	7	7	8	8	8	7	6	3	Closed	Closed	63
140.8		3	6	7	7	8	8	8	8	6	3	Closed	Closed	64
143.0		3	6	7	8	8	8	8	8	6	3	Closed	Closed	65
145.2		3	6	7	8	8	9	8	8	6	3	Closed	Closed	66
147.4		3	6	7	9	8	9	8	8	6	3	Closed	Closed	67
149.6		3	6	7	9	9	9	8	8	6	3	Closed	Closed	68
151.8		3	6	7	9	9	9	8	9	6	3	Closed	Closed	69
154.0		3	6	7	9	9	9	9	9	6	3	Closed	Closed	70
156.2		3	6	7	9	9	9	9	9	7	3	Closed	Closed	71

2009 WANAPUM DAM SPILL GATE OPERATIONS FOR INADVERTENT SPILL

During "Night Time" Fish Spill

Total Spill In KCFS	Gate Number											Sluice Gate	Total Opening In Feet
	1	2	3	4	5	6	7	8	9	10	11	12		
158.4		3	6	8	9	9	9	9	9	7	3	Closed	Closed	72
160.6		3	6	8	9	10	9	9	9	7	3	Closed	Closed	73
162.8		3	6	8	9	10	9	10	9	7	3	Closed	Closed	74
165.0		3	6	8	9	10	10	10	9	7	3	Closed	Closed	75
167.2		3	6	8	9	10	10	10	10	7	3	Closed	Closed	76
169.4		3	6	8	10	10	10	10	10	7	3	Closed	Closed	77
171.6		3	7	8	10	10	10	10	10	7	3	Closed	Closed	78
173.8		4	7	8	10	10	10	10	10	7	3	Closed	Closed	79
176.0		4	7	9	10	10	10	10	10	7	3	Closed	Closed	80
178.2		4	7	10	10	10	10	10	10	7	3	Closed	Closed	81
180.4		4	7	10	10	11	10	10	10	7	3	Closed	Closed	82
182.6		4	7	10	10	11	10	11	10	7	3	Closed	Closed	83
184.8		4	7	10	10	11	11	11	10	7	3	Closed	Closed	84
187.0		4	7	10	11	11	11	11	10	7	3	Closed	Closed	85
189.2		4	7	10	11	11	11	11	11	7	3	Closed	Closed	86
191.4		4	7	11	11	11	11	11	11	7	3	Closed	Closed	87
193.6		4	8	11	11	11	11	11	11	7	3	Closed	Closed	88
195.8		4	8	11	11	12	11	11	11	7	3	Closed	Closed	89
198.0		4	8	11	11	12	12	11	11	7	3	Closed	Closed	90

Note:

1. Spill based on reservoir elevation of 570 feet.
2. Spillway with spill deflector (flip-lip) functioning in spillbays 1-11.
3. Spillbay discharge based upon the June 23, 1999 revised spillway discharge table.
4. Deflector performance is assumed lost after 4 feet opening.
5. "Night Time" is 1900 hr - 0700 hr.

Table 5 Priest Rapids Dam Inadvertent Spill Protocol in 2009

Total Spill In KCFS	Gate Number																					Total Opening In Feet
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
24.3																			**Open**	**0pen**	**5**	**sluice open**	-
25.6					1														Open	0pen	5	sluice open	6
26.9					2														Open	0pen	5	sluice open	7
28.2					3														Open	0pen	5	sluice open	8
29.5					4														Open	0pen	5	sluice open	9
30.8				1	4														Open	0pen	5	sluice open	10
32.1				2	4														Open	0pen	5	sluice open	11
33.4				3	4														Open	0pen	5	sluice open	12
34.7				3	4	1													Open	0pen	5	sluice open	13
36.0				3	4	2													Open	0pen	5	sluice open	14
37.3				3	4	3													Open	0pen	5	sluice open	15
38.6				3	4	3	1												Open	0pen	5	sluice open	16
39.9				3	4	3	2												Open	0pen	5	sluice open	18
41.2			1	3	4	3	2												Open	0pen	5	sluice open	19
42.5			2	3	4	3	2												Open	0pen	5	sluice open	20
43.8			2	3	4	4	2												Open	0pen	5	sluice open	21
45.1			2	4	4	4	2												Open	0pen	5	sluice open	22
46.4			2	4	4	4	2	1											Open	0pen	5	sluice open	23
47.7			2	4	4	4	3	1											Open	0pen	5	sluice open	24
49.0			2	4	4	5	3	1											Open	0pen	5	sluice open	25
50.3			2	4	5	5	3	1											Open	0pen	5	sluice open	26
51.6			2	4	5	5	3	2											Open	0pen	5	sluice open	27
52.9			2	4	5	5	4	2											Open	0pen	5	sluice open	28
54.2			2	4	5	5	4	2	1										Open	0pen	5	sluice open	29
55.5			2	4	5	5	5	2	1										Open	0pen	5	sluice open	30
56.8			2	4	5	5	5	3	1										Open	0pen	5	sluice open	31
58.1			2	4	5	5	5	3	2										Open	0pen	5	sluice open	32
59.4			2	4	5	6	5	3	2										Open	0pen	5	sluice open	33
60.7			2	4	5	6	5	4	2										Open	0pen	5	sluice open	34
62.0			2	4	5	6	5	4	2	1									Open	0pen	5	sluice open	35
63.3			2	4	5	6	5	4	3	1									Open	0pen	5	sluice open	36
64.6			2	4	5	6	5	4	3	2									Open	0pen	5	sluice open	37

Total Spill In KCFS	Gate Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Total Opening In Feet
65.9			2	4	5	6	5	5	3	2									Open	0pen	5	sluice open	38
67.2			2	4	5	6	6	5	3	2									Open	0pen	5	sluice open	39
68.5			2	4	5	6	6	5	4	2									Open	0pen	5	sluice open	40
69.8			2	4	5	6	6	6	4	2									Open	0pen	5	sluice open	41
71.1			2	4	5	6	6	6	4	2	1								Open	0pen	5	sluice open	42
72.4			2	4	5	6	6	6	4	3	1								Open	0pen	5	sluice open	43
73.7			2	4	5	6	6	6	5	3	1								Open	0pen	5	sluice open	44
75.0			2	4	5	6	6	6	5	3	2								Open	0pen	5	sluice open	45
76.3			2	4	5	6	6	7	5	3	2								Open	0pen	5	sluice open	46
77.6			2	4	5	7	6	7	5	3	2								Open	0pen	5	sluice open	47
78.9			2	4	5	7	6	7	5	4	2								Open	0pen	5	sluice open	48
80.2			2	5	5	7	6	7	5	4	2								Open	0pen	5	sluice open	49
81.5			2	5	5	7	6	7	5	5	2								Open	0pen	5	sluice open	50
82.8			2	5	5	7	6	7	5	5	2	1							Open	0pen	5	sluice open	51
84.1			2	5	5	7	6	7	5	5	3	1							Open	0pen	5	sluice open	52
85.4			2	5	5	7	6	7	6	5	3	1							Open	0pen	5	sluice open	53
86.7			2	5	5	7	6	7	6	5	3	2							Open	0pen	5	sluice open	54
88.0			2	5	5	7	6	7	6	5	4	2							Open	0pen	5	sluice open	55
89.3			2	5	6	7	6	7	6	5	4	2							Open	0pen	5	sluice open	56
90.6			2	5	6	7	7	7	6	5	4	2							Open	0pen	5	sluice open	57
91.9			2	5	6	7	7	7	6	5	4	2	1						Open	0pen	5	sluice open	58
93.2			2	5	6	7	7	7	6	5	4	3	1						Open	0pen	5	sluice open	59
94.5			2	5	6	7	7	7	6	5	5	3	1						Open	0pen	5	sluice open	60
95.8			2	5	6	7	7	7	6	5	5	3	2						Open	0pen	5	sluice open	61
97.1			2	5	6	7	7	7	6	5	5	4	2						Open	0pen	5	sluice open	62
98.4			2	5	6	7	8	7	6	5	5	4	2						Open	0pen	5	sluice open	63
99.7			2	5	6	7	8	7	6	6	5	4	2						Open	0pen	5	sluice open	64
101.0			2	5	6	7	8	7	6	7	5	4	2						Open	0pen	5	sluice open	65
102.3			2	5	6	7	8	7	7	7	5	4	2						Open	0pen	5	sluice open	66
103.6			2	5	6	7	8	7	8	7	5	4	2						Open	0pen	5	sluice open	67
104.9			2	5	6	7	8	7	8	7	6	4	2						Open	0pen	5	sluice open	68
106.2			2	5	6	7	8	8	8	7	6	4	2						Open	0pen	5	sluice	69

Total Spill In KCFS	Gate Number																					Total Opening In Feet
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
																						open sluice
107.5			2	5	6	7	8	8	8	7	6	5	2						Open	0pen	5	open
108.8			2	5	6	7	9	8	8	7	6	5	2						Open	0pen	5	sluice open
110.1			2	5	6	7	9	8	9	7	6	5	2						Open	0pen	5	sluice open
111.4			2	5	6	7	9	8	9	7	6	5	2	1					Open	0pen	5	sluice open
112.7			2	5	6	7	9	8	9	7	6	5	3	1					Open	0pen	5	sluice open
114.0			2	5	6	7	9	8	9	7	6	5	3	2					Open	0pen	5	sluice open
115.3			2	5	7	7	9	8	9	7	6	5	3	2					Open	0pen	5	sluice open
116.6			2	5	7	8	9	8	9	7	6	5	3	2					Open	0pen	5	sluice open
117.9			2	5	7	8	9	8	9	7	7	5	3	2					Open	0pen	5	sluice open
119.2			2	5	7	8	9	8	9	8	7	5	3	2					Open	0pen	5	sluice open
120.5			2	5	7	8	9	9	9	8	7	5	3	2					Open	0pen	5	sluice open
121.8			2	5	7	8	9	9	9	8	7	6	3	2					Open	0pen	5	sluice open
123.1			2	5	7	8	9	9	9	9	7	6	3	2					Open	0pen	5	sluice open
124.4			2	5	7	8	9	9	9	9	7	6	4	2					Open	0pen	5	sluice open
125.7			2	5	7	8	9	9	9	9	7	6	5	2					Open	0pen	5	sluice open
127.0			2	5	7	8	9		9	9	7	6	5	2	1				Open	0pen	5	sluice open
128.3			2	5	7	8	9	9	9	9	7	6	5	3	1				Open	0pen	5	sluice open
129.6			2	5	7	8	9	9	9	9	7	6	5	4	1				Open	0pen	5	sluice open
130.9			2	5	7	8	9	9	9	9	7	6	5	4	2				Open	0pen	5	sluice open
132.2			2	5	8	8	9	9	9	9	7	6	5	4	2				Open	0pen	5	sluice open
133.5			2	5	8	8	9	9	9	9	7	7	5	4	2				Open	0pen	5	sluice open
134.8			2	5	8	8	9	9	9	9	7	7	6	4	2				Open	0pen	5	sluice open
136.1			2	5	8	8	9	9	9	9	8	7	6	4	2				Open	0pen	5	sluice open
137.4			2	5	8	8	9	9	9	9	8	7	6	5	2				Open	0pen	5	sluice open
138.7		1	2	5	8	8	9	9	9	9	8	7	6	5	2				Open	0pen	5	sluice open
140.0		1	2	5	8	8	9	10	9	9	8	7	6	5	2				Open	0pen	5	sluice open
141.3		1	2	5	8	8	9	10	9	10	8	7	6	5	2				Open	0pen	5	sluice open
142.6		1	2	5	8	8	9	10	9	10	8	7	7	5	2				Open	0pen	5	sluice open
143.9		1	2	5	8	8	9	10	9	10	8	8	7	5	2				Open	0pen	5	sluice open
145.2		1	2	5	8	8	9	10	9	10	9	8	7	5	2				Open	0pen	5	sluice open
146.5		1	3	5	8	8	9	10	9	10	9	8	7	5	2				Open	0pen	5	sluice open
147.8		1	3	6	8	8	9	10	9	10	9	8	7	5	2				Open	0pen	5	sluice

Total Spill In KCFS	Gate Number																					Total Opening In Feet
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
149.1		1	3	6	8	9	9	10	9	10	9	8	7	5	2				Open	0pen	5	open sluice open	102
150.4		1	3	6	8	9	9	10	10	10	9	8	7	5	2				Open	0pen	5	sluice open	103
151.7		1	3	6	8	9	9	10	10	10	9	8	7	5	2	1			Open	0pen	5	sluice open	104
153.0		1	3	6	8	9	9	10	10	10	9	8	7	5	3	1			Open	0pen	5	sluice open	105
154.3		1	3	6	8	9	9	10	10	10	9	8	7	6	3	1			Open	0pen	5	sluice open	106
155.6		1	3	6	8	9	9	10	10	10	9	8	7	6	3	2			Open	0pen	5	sluice open	107
156.9		1	3	6	8	9	9	10	10	10	9	8	7	6	3	2	1		Open	0pen	5	sluice open	108
158.2		1	3	6	8	9	9	10	10	10	9	8	7	6	3	3	1		Open	0pen	5	sluice open	109
159.5		1	3	6	8	9	9	10	10	10	9	8	7	6	4	3	1		Open	0pen	5	sluice open	110
160.8		1	3	6	8	9	9	10	10	10	9	8	7	7	4	3	1		Open	0pen	5	sluice open	111
162.1		1	3	7	8	9	9	10	10	10	9	8	7	7	4	3	1		Open	0pen	5	sluice open	112
163.4		1	3	7	8	9	9	10	10	10	9	8	7	7	5	3	1		Open	0pen	5	sluice open	113
164.7		1	3	7	8	9	9	10	10	10	9	8	7	7	5	3	1	1	Open	0pen	5	sluice open	114
166.0		1	3	7	9	9	9	10	10	10	9	8	7	7	5	3	1	1	Open	0pen	5	sluice open	115
167.3		1	3	7	9	9	9	10	10	10	9	8	8	7	5	3	1	1	Open	0pen	5	sluice open	116
168.6		1	3	7	9	9	9	10	10	10	9	8	8	7	6	3	1	1	Open	0pen	5	sluice open	117
169.9		1	3	7	9	9	9	10	10	10	9	8	8	7	6	4	1	1	Open	0pen	5	sluice open	118
171.2		1	3	7	9	9	9	10	10	10	9	8	8	7	6	4	2	1	Open	0pen	5	sluice open	119
172.5		1	3	7	9	9	9	10	10	10	9	8	8	7	6	5	2	1	Open	0pen	5	sluice open	120
173.8		1	3	7	9	9	10	10	10	10	9	8	8	7	6	5	2	1	Open	0pen	5	sluice open	121
175.1		1	3	7	9	9	10	11	10	10	9	8	8	7	6	5	2	1	Open	0pen	5	sluice open	122
176.4		1	3	7	9	9	10	11	10	10	9	8	8	7	7	5	2	1	Open	0pen	5	sluice open	123
177.7		1	3	7	9	9	10	11	10	10	9	8	8	8	7	5	2	1	Open	0pen	5	sluice open	124
179.0		2	3	7	9	9	10	11	10	10	9	8	8	8	7	5	2	1	Open	0pen	5	sluice open	125
180.3		2	4	7	9	9	10	11	10	10	9	8	8	8	7	5	2	1	Open	0pen	5	sluice open	126
181.6		2	4	7	9	9	10	11	10	10	9	9	8	8	7	5	2	1	Open	0pen	5	sluice open	127
182.9		2	4	7	9	9	10	11	10	11	9	9	8	8	7	5	2	1	Open	0pen	5	sluice open	128
184.2		2	4	7	9	9	10	11	10	11	9	9	8	8	7	5	3	1	Open	0pen	5	sluice open	129
185.5		2	4	7	9	9	10	11	10	11	9	9	8	8	7	6	3	1	Open	0pen	5	sluice open	130
186.8		2	4	7	9	9	10	11	10	11	9	9	9	8	7	6	3	1	Open	0pen	5	sluice open	131
188.1		2	4	7	9	9	10	11	10	11	9	9	9	8	7	6	3	2	Open	0pen	5	sluice open	132

Total Spill In KCFS	Gate Number																					Total Opening In Feet
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
189.4		2	4	7	9	9	10	11	10	11	10	9	9	8	7	6	3	2	Open	0pen	5	sluice open	133
190.7		2	4	7	9	9	10	11	10	11	10	9	9	8	8	6	3	2	Open	0pen	5	sluice open	134
192.0		2	4	7	9	9	10	11	11	11	10	9	9	8	8	6	3	2	Open	0pen	5	sluice open	135
193.3		2	4	7	9	10	10	11	11	11	10	9	9	8	8	6	3	2	Open	0pen	5	sluice open	136
194.6		2	4	7	9	10	10	11	11	11	10	9	9	9	8	6	3	2	Open	0pen	5	sluice open	137
195.9		2	4	7	9	10	10	11	11	11	10	10	9	9	8	6	3	2	Open	0pen	5	sluice open	138
197.2		2	4	7	9	10	10	11	11	11	10	10	9	9	8	6	4	2	Open	0pen	5	sluice open	139
198.5		2	4	7	9	10	10	11	11	11	10	10	10	9	8	6	4	2	Open	0pen	5	sluice open	140
199.8		2	4	7	9	10	10	11	11	11	11	10	10	9	8	6	4	2	Open	0pen	5	sluice open	141
201.1		2	4	7	9	10	10	11	11	11	11	11	10	9	8	6	4	2	Open	0pen	5	sluice open	142

Note: Spill based on reservoir elevation of 486 feet.

Appendix B
Agency Comments Received

>>> <Jim_L_Craig@fws.gov> 2/8/2010 1:40 PM >>>

Tom,

Here are my comments on the reports with due date of Feb 8. And I agree with comments provided previously by Bryan and Teresa. *(Grant PUD – Julie E. Pyper 02/11/10 Jim is making reference to the Fish Ladder Temperature Monitoring Plan (that Bryan and Teresa commented on) not the Fishery Operations Plan).*

2010 Downstream Passage Alternatives Plan

Report looks good, few minor comments: I need a clarification on the 2006 juvenile steelhead survival estimate presented in paragraph 2 of Section 3.2 (page 3). It is stated that survival through the Priest Rapids Project (both developments and reservoirs) was estimated at 57.25% (SE=3.02%). Is that a measured survival estimate or the product of the two survival (Wanapum and Priest projects) estimates provided in the preceding sentences? If the later, than the math is wrong as 71.95% X 71.64% = 51.54%, not 57.25% as presented.

Section 3.2, page 3. It is stated that the PRCC determined that the 2006 steelhead survival studies were invalid, which is true, but it would be informative to give the rationale (e.g. tagger effects).

Section 3.7.2, Page 9. Recommend you spell out Biological Assessment and Management Plan before first using the acronym BAMP.

Section 7.0, page 29 (2nd paragraph). "or" should be "of" right before 18,589 northern pikeminnow.....

Fishery Operations Plan 2010

Looked fine.

Progress and Implementation Report 2009-2010

I just briefed through the report and will have to defer my comment to those provided by NOAA and or others.

My comments regarding the Study Plan to Evaluate Fish Ladder Water Temperature at Priest Rapids and the Shallow Water Habitat WQM Plan were submitted previously via 25 January 2010 email.

Jim L. Craig
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>>> Bryan Nordlund <Bryan.Nordlund@noaa.gov> 2/4/2010 8:30 AM >>>
Good Morning Tom - below are NMFS comments on four FERC submittals that Grant PUD routed to the PRCC for comment. The quoted text below is a cut/paste from the submittal, followed by my comment. Except - in comments on the ladder water temperature study, I also imported text from the license. Give me a call or email if any of these need to be discussed. Thanks,
bn

2010 Downstream Passage Alternatives Action Plan
This looked very good to me, but I have a few suggestions below to add clarity and context.

Page 4, paragraph 3, regarding the sentence: "In addition, higher than expected numbers of fish were detected at the downstream PIT-tag detection facilities that were also not detected by the hydrophones." It would be helpful to clarify that the hydrophones were part of the PRP study array, and fish were incidentally detected at the downstream PIT facilities, which were not part of the study design.

Page 6, paragraph 2, regarding the sentences: "On November 24, 2009 a sub-yearling Chinook workshop was held to discuss the feasibility of conducting a valid sub-yearling Chinook survival study. Grant PUD and PRCC representatives attended this workshop." From this sentence, it sounds as if the PRCC were the only attendees. I would mention the other organizations represented, particularly noting their expertise in sub-yearling study designs.

Page 6, paragraph 3, regarding the sentences: "If current tagging methodologies will not allow for an accurate reservoir survival estimate to be achieved, Grant PUD, in consultation with the PRCC, may submit that only dam-passage survival for subyearling Chinook can be obtained and be used to evaluate performance standards for subyearling Chinook." I'd suggest that this is still in discussion, and not part of the action plan - at least not yet. What you can say, is that the sub-yearling study to date has demonstrated that there is the capability to measure sub-yearling dam passage survival, and that the sub-yearling behavior/survival/fate in the PRP reservoirs is not currently measurable because of the complexity described in preceding text. But the PRCC is still considering how this might be done.

Somewhere at the end of Section 3.5 - it would be useful to include a brief table that summarizes the project survival estimates by year for all SSSA species. A new line could be added to this table each year, reflecting the current study results.

Page 6, paragraph 3, regarding the sentence: "Sullivan et al (2008) reported that fish passage efficiencies for steelhead, yearling Chinook and sockeye through the Wanapum Fish Bypass were 54%, 29% and 32%, respectively." I don't believe that fish passage efficiency in context of GPUD's behavioral study has been previously defined in this document - it needs to be.

Page 18 Figure 3, and Page 25, Figure 5: I don't believe that these flow charts have ever been approved by the PRCC. Specifically, this is because these charts do not call for measurement of the project survival standard of 93% as part of the decision process. It's likely that residence time

in Wanapum or Priest Rapids forebay is dependent on the ability to detect and use a bypass route. If this is the case, dam passage survival may exceed 95%, but if forebay predation increases with residence time, I don't consider bypass configuration to be optimized and it could play a role in meeting project survival standards.

Page 29, paragraph 4: "Of the 1,269 setlines deployed, 1,221 set lines (96% of all set lines) were fished in Wanapum Reservoir, and 48 set lines (4%) were fished in the Priest Rapids Reservoir.". I did not realize (or have forgotten) that there was such a disproportional use of set lines in each reservoir. The reason for this needs to be explained.

PRP Fishery Operations Plan for 2010
This looked pretty good to me, with just minor edits to suggest.

One pertains to the discussion on page 5, paragraph 1 first sentence where I suggest deleting the end of the sentence, from the last comma to the end of the sentence (we've never discussed Wanapum bypass operations during extended low tailwater conditions). I'd also ask that GPUD state its intentions to maintain tailwater elevations over 488 when the Wanapum bypass operates (as stated in the DPAAP).

The other pertains to table 5 in appendix A, which calls for the sluice gate (spillway gate 22) at Priest Rapids to be open, as opposed to recent PRCC discussions for which gate 22 operations are still to be determined.

Progress and Implementation Report 2009-2010
Page 6, paragraph 2, regarding the sentence: "Fish passage efficiencies for steelhead, yearling Chinook and sockeye through the WFB were 57%, 31% and 34%, respectively.". I don't believe that fish passage efficiency in context of GPUD's behavioral study has been previously defined in this document - it needs to be. These efficiencies, apparently from Sullivan et al (2008), are different than reported in the 2010 Downstream Passage Alternatives Action Plan: "Sullivan et al (2008) reported that fish passage efficiencies for steelhead, yearling Chinook and sockeye through the Wanapum Fish Bypass were 54%, 29% and 32%, respectively."

page 8: "Grant PUD met with NMFS and WDFW on May 12, 2008 to establish concurrence (with the PRCC) to implement alternative spill measures if river conditions were such to cause the WFB to operate outside of its designed operation criteria. These alternative spill measures would consist of reducing the 20 kcfs flow over the WFB to a lower flow amount (i.e. 15 kcfs) by installing one or more of the WFB's leaf gates."I would characterize the May 12 meeting with GPUD, WDFW and NMFS as a discussion of interim measures to deal with an immediate situation, not as a long-term solution. I also understood from this meeting that GPUD intends to make every effort to maintain the Wanapum tailwater (Priest Rapids pool) at 488 or higher during the passage season - I urge GPUD to continue this effort, as this may well be something that directly affects juvenile survival through the project.

Page 9, partial paragraph: "When the WFB's flow is reduced from 20 kcfs to 15 kcfs, the out-flow jet is returned to a skimming surface jet, which in turn, reduces fish injury and/or mortality." Without disagreeing with the concept, I point out that this is not established fact but

is stated as such. I don't believe we have any data that supports this at the project - only subjective viewing of the physical model, and no biological data.

Page 9, first full paragraph: "With concurrence from the Spill Committee, WFB flow was reduced from 20 kcfs to 15 kcfs when the Wanapum tailwater elevation drops below 488 and/or the river flow into Wanapum Dam falls below 60 kcfs. When the Wanapum Dam tailwater elevation returns to 488 or above, the flow through the WFB would be returned to 20 kcfs." Approval of actions per the T&C 1.5 requires NMFS approval, not spill committee approval. Did NMFS approve? Also, any WFB operation in 2008 or 2009 at less than 20kcfs should be reported.

Page 9, near the bottom: "To fulfill the requirements of License Article 401(a)(9), Grant PUD, in consultation with the PRCC, developed a Wanapum Dam Interim Spill Regime Evaluation Plan. The plan was filed with FERC for approval on May 8, 2009 and FERC issued an Order approving the plan on October 23, 2009. The approved plan can be viewed at: http://www.gcpud.org/prcc/supportingdocumentation.htm." I do not recall what this FERC filing is - and the link doesn't take me to the plan to remind me what it is. Please explain.

Page 14, paragraph 6: "Fish passage efficiencies for steelhead, yearling Chinook and sockeye through the top-spill configuration were 30%, 24% and 26%, respectively." Please define fish passage efficiency.

Page 16, paragraph 2: "The start and end dates for fish-spill seasons were conducted with the concurrence of the designated Spill Committee of the PRCC". Again, this T&C requires NMFS approval, and its not stated whether NMFS was represented on the Spill Committee that concurred.

Page 25, paragraph 6: "Of the 1,269 setlines deployed, 1,221 set lines (96% of all set lines) were fished in Wanapum Reservoir, and 48 set lines (4%) were fished in the Priest Rapids Reservoir". I did not realize (or have forgotten) that there was such a disproportional use of set lines in each reservoir. The reason for this needs to be explained.

Page 50, paragraph 3: "The Okanagan Nation Alliance (ONA) and its project partners propose to construct fish passage at the dam and to install a fish screen on the irrigation canal located on the upstream side of the dam." As I understood this project, with NNI funds, ONA and partners were supposed to replace spill gates to make them passable, and install a "Newberry Riffle", to elevate the tailwater below McIntyre to help improve upstream passage. The screen was supposed to be funded by someone else, and installed later

Page 51, paragraph 1: "In 2009, all major construction was completed on both the dam for passage and irrigation canal for screening (Figure 6)." I don't think the fish screens have been installed, nor were they part of the funding awarded for the project. In addition, I understand that there are still passage issues at the dam that the ONA is trying to solve - the jump is apparently a little too high for some sockeye, and there is occasionally some injury while jumping. Also, the "Newberry riffle" portion of the project is not mentioned. If this was not installed, it explains why the jump is still an issue.

<<<<< Note: I did not review the hatchery report. >>>>>

Page 74, last entry: I realize that there were issues with acoustic tags in the past, but did not know that a result was "... Project suing Acoustic-tags in 2009". That dang spell-checker.

A Study Plan to Evaluate Fish Ladder Water Temperature at Priest Rapids Dam
>From Department of Ecology's (DOE) 401:
"Grant PUD shall address localized temperature conditions identified at the fish ladders by modifying the fish ladder water supply as described in the FLA Exhibit E-4 pp. 123-133 and Exhibit E-3. Upon issuance of the New License, Grant PUD shall, in consultation with Ecology, the PRCC and PRFF, begin to develop a plan to monitor temperatures above, below and within the fish ladders at the two dams. The plan shall be completed, and the monitoring begin, by spring of Year 2, with the results provided by December of that year. If the results show that the daily maximum or daily average temperatures in the ladder are higher than above or below the ladder, Grant PUD shall, again in consultation with Ecology, the PRCC and PRFF, develop a plan to address elevated temperatures. The plan shall be completed by December of the following year, and implemented in accordance with the Ecology-approved schedule."

>From GPUD Fish Ladder Water Supply Monitoring Study (FLWS):
"The FLWS study is also related to Article 403 of the license, which requires that Grant PUD file a plan for FERC approval for installing and operating a tailrace pumping system at Priest Rapids Dam for its fish ladders. The intent of the FLWS study is to verify that any changes to the Priest Rapids Dam fish ladder water supply does not negatively impact water temperatures, compared to baseline data collected from 2002 - 2004. The objective of the FWLS (sic) is to monitor water temperatures at the entrance, middle, and exit points within each Priest Rapids Dam fish ladder in order to determine potential negative impacts to water temperatures based on changes in the fish ladder water supply compared to the baseline data collected in 2002 - 2004. Because the objective of the FLWS study is to monitor water temperatures after the Priest Rapids Dam fish ladder supply system is competed, the study will not be initiated until changes are complete."

>From Article 403
"Tailrace Pumping System for Fishway Water Supply. Within six months of the issuance date of the license, the licensee shall file for Commission approval a plan for installing and operating a tailrace pumping system for each fishway water supply.

The plan shall include, but not be limited to the following: (a) detailed design drawings of the proposed pumping facilities for each fishway; and (b) and implementation schedule."

NMFS Comments and Recommendations
DOE calls for GPUD to develop a plan that corrects temperature issues in the Priest Rapids ladders by modifying the ladder auxiliary water supply (AWS) systems through consultation with the Agencies. DOE also calls for monitoring fish ladder, forebay and tailwater temperatures in the Priest Rapids ladders. In contrast, GPUD's FLWS is intended to "... determine potential negative impacts to water temperatures based on changes in the fish ladder water supply

compared to the baseline data collected in 2002 - 2004" at Priest Rapids only, and within the ladder only, and after the Article 403 fishway water supply modifications are complete.

Existing Priest Rapids fish ladder, forebay and tailwater temperature data is reported by GPUD in Appendix A of the FLWS. Examination of this data indicates that temperatures range from a minimum of -0.6º C (mid-ladder, November of 2003 or 2004), to 38.1º C (mid-ladder, July and August of 2003 or 2004). Either extreme is probably lethal to salmon and steelhead, but I'd guess that these data are not representative of actual passage conditions in the ladder, and are more likely due to a temperature probe being in direct sun, or a temperature probe exposed to below freezing temperatures in a fishway dewatered for winter maintenance. In either case, rebuilding the AWS is not likely to remedy these extremes if they actually exist. GPUD should confirm that this is the case for either extreme by additional temperature monitoring. Since temperature instrumentation is relatively easy to install, monitor and maintain, I'd recommend that the FLWS include a ongoing temperature monitoring component at locations in each fish ladder that are likely to reflect temperature variation due to AWS flow additions. Water temperature recording equipment currently exists at the forebay and tailwater dissolved gas monitoring stations, and these are satisfactory.

Generally, temperatures in entrance of the left bank ladder are cooler than temperatures in the right bank ladder by up to 0.7º C (FLWS, Table 7), and on average by 0.2º C. Since the right bank ladder water supply is currently supplied from the left bank AWS, there is apparently warming of this flow as it crosses through the powerhouse, spillway and to the right bank ladder. In addition, right bank fish ladder entrance flow is up to 1.4º C warmer than the tailwater. I recall that the longest passage times in previous adult fish radio telemetry studies corresponded to those species passing in the late summer or early fall, when these temperature differentials are largest. I also recall that the right bank ladder is used less frequently by fish, potentially caused in part by the higher temperature of the entrance flow. To reduce these temperature differentials, I'd recommend that the AWS redesign include a new tailrace pump station for the right bank ladder. A new right bank AWS system may eliminate the need for expansion of the existing left bank pump system, and use of the Gravity Intake Gate (GIG), and allow independent operation of each fish ladder. I'd also recommend replacing the portion of the AWS flow currently supplied from the forebay via the GIG with flow pumped from the tailrace to help to bring ladder entrance flow temperatures closer to the temperature of the tailrace, potentially reducing passage delay.

Appendix C
Summary Table of Agency Comments and Grant PUD Responses

SUMMARY TABLE OF COMMENTS AND GRANT PUD RESPONSES – 2010 Fishery Operations Plan

Submitting Entity	Date Received	Paragraph #	Agency Comment	Grant PUD Response
NOAA	2/04/2010	Sec. 3.0 / Paragraph # 1 / Sentence #9	Pertaining to the discussion on page 5, paragraph 1, first sentence, I suggest deleting the end of the sentence, from the last comma to the end of the sentence (we've never discussed Wanapum bypass operations during extended low tailwater conditions)….	Comment Noted. The sentence referenced does not state "extended" periods of time that the tailwater may drop below 488.0 ft., it only reflects discussions of the PRCC in response to river conditions observed the first week of May, 2008 when the Wanapum tailwater dropped below 488.0 ft. for a couple of days.
NOAA	2/04/2010	Sec. 3.0 / Paragraph # 1	…. I'd also ask that GPUD state its intentions to maintain tailwater elevations over 488 when the Wanapum bypass operates (as stated in the DPAAP).	Comment Noted. Grant PUD intents to maintain a tailwater elevation above 488.0 ft as stated as follows "*Grant PUD will maintain the Wanapum tailwater elevations to stay within the range of 488.0 to 498.0 feet during the salmonid out-migration season during non-extreme river condition periods.*"
NOAA	2/04/2010		The other pertains to table 5 in appendix A, which calls for the sluice gate (spillway gate 22) at Priest Rapids to be open, as opposed to recent PRCC discussions for which gate 22 operations are still to be determined.	Table 5 in appendix A illustrates the Priest Rapids Dam spill pattern that was used during times of inadvertent spill in 2009. The comment from NOAA is accurate in reference to gate 22 operations as it relates to year 2010.